

BTeV WBS Dictionary

Subproject WBS Level 2 Element Number

WBS 1.19
System Installation, Integration and Testing

May 12, 2000

This document provides WBS Dictionary information for a BTeV WBS Level 2 project and all its subprojects.

WBS Element Number:		
[1.19	
WBS Element Name:		
	System Installation, Integration and Commissioning	
-		
WBS Element Definit	tion:	
	This element covers all installation tasks not explicitly covered in the individual subsystem sections of the WBS. The purpose 1.19 is to coordinate the subsections of the detector and insure they work together. Detector alignment and calibration are also covered in the section.	
Ground Rules & Assumptions:		
	NA	
l		
Cost Estimate Source		
	In lower levels	
Basis of Cost Estimat	· · ·	
Dasis of Cost Estimat	NA	

WBS Element Number:	
	1.19.1
WBS Element Name:	
W DS Element Name.	System Installation
	by stem instantation
WBS Element Definit	
	This element covers all installation tasks not explicitly covered in the individual
	subsystems. Support items such as cable trays and cable installation. Relay rack installation and associated items such as cooling, power supplies, etc. are covered
	herein.
Ground Rules & Assi	umptions:
	The installation of each detector subsystem is included in the WBS section for that
	subsystem.
Cost Estimate Source	
Cost Estimate Source	This element is rolled up from lower levels.
	This cionicia is rolled up from lower levels.
Basis of Cost Estimat	ρ·
Zasis of Cost Estimat	The time estimates are from past experience in installing and testing large detectors
	at FNAL.

WBS Element Number:		
	1.19.1.1	
WBS Element Name:		
	Site Installation Crew (3 Technicians)	
WBS Element Definition	on•	
7	This element is meant to cover the multitude of installation tasks that are not covered elsewhere in this proposal.	
Ground Rules & Assumptions:		
j	We assume that a three technician crew will work full time for three years on BTeV installation, integration testing and commissioning tasks.	
Cost Estimate Source:		
	Fermilab labor cost for technicians.	
Basis of Cost Estimate:		
	Past experience and observation of other similar size experiment installations at Fermilab.	

WBS Element Numb	er:
	1.19.1.2
WBS Element Name:	
WBS Element Name.	Detector and Counting Room Cable Trays
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WBS Element Defini	tion.
WDS Element Denni	Cable trays shared by cables for more than one subsystem.
	energe and a superstance of the superstance and superstance an
Ground Rules & Ass	umptions:
	Costs placed here for cable trays since instead of subsections since they are a shared
	facility.
Cost Estimate Source	: :
	Fermilab labor rates
Basis of Cost Estimat	
	Cable trays are from other similar installations at FNAL. Personnel times are from past experience with similar installations.
	past experience with similar installations.

WBS Element Numb	er:
TO Element I turns	1.19.1.3
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WBS Element Name:	
WBS Element Name.	Cable Installation
WBS Element Defini	tion:
WBS Element Deimi	This element covers all of the cable plant from the detector to the counting room.
	•
Ground Rules & Assi	
	This is meant to cover odds and ends not covered elsewhere; for instance some BTeV-wide monitoring systems may need cables which are not included in any
	detector WBS
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Cost Estimate Source	Fermilab labor rates
	Terminab fabor faces
Basis of Cost Estimat	
	Personnel times are from past experience with similar installations. Adjustments
	made for unforeseen problems at other installations.

WBS Element Number:	
	1.19.1.3.1
WBS Element Name:	
WDS Element Name:	On and Near-Detector
	on and rotal Botootto
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WBS Element Defini	tion:
	Cables not included in any other WBS item.
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Ground Rules & Assi	umptions:
	These are things we haven't thought of yet.
Cost Estimate Source	
	Fermilab labor rates
l	
Basis of Cost Estimat	
	Past experience.

WBS Element Number:		
	1.19.1.3.2	
<u>.</u>		
WBS Element Name:		
	Detector to Counting Room	
l		
WBS Element Definit	tion•	
VV DO LICINCIII Delliii	A011.	
Ground Rules & Assu	umptions:	
Cost Estimate Source		
	Fermilab labor rates	
-		
Basis of Cost Estimat	e:	
	Past experience	
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WBS Element Numb	
	1.19.1.3.3
WBS Element Name:	
	Relay Rack and Subrack Installation, Powering, & Cooling
WBS Element Defini	
	Install generic relay racks and associated hardware.
Ground Rules & Assi	umptions:
3104114 114145 00 1155	BTeV will recycle existing racks from completed experiments. Power and cooling
	hardware is costed is each subsection.
	nata wate is costed is each subsection.
Cost Estimate Source	
	Fermilab labor rates
Basis of Cost Estimat	
	Past experience
g	

WBS Element Number:	
	1.19.2

WBS Element Name:	
	Procedure Specification
WBS Element Definit	tion•
W Do Element Delini	This element will set the procedures for start up, run time and error recovery. This
	item needs to be implemented at the start of the detailed design since some features
	the software will need will have to be implemented in the hardware.
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l	
Ground Rules & Assi	umptions:
	N/A
Cost Estimate Source	31
Cost Estimate Source	This element is rolled up from lower levels.
	This croment is routed up from force revers.
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Basis of Cost Estimat	
	Past experience

WBS Element Name: Run Startup & Stop & Partitioning WBS Element Definition: Establish procedures for system synchronization at the start of each run. Establish procedure for stopping a run. Establish procedure for running subsections of the DAQ independently of one another (partitioning).	
WBS Element Definition: Establish procedures for system synchronization at the start of each run. Establish procedure for stopping a run. Establish procedure for running subsections of the DAQ independently of one	
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Establish procedures for system synchronization at the start of each run. Establish procedure for stopping a run. Establish procedure for running subsections of the DAQ independently of one	
Establish procedure for stopping a run. Establish procedure for running subsections of the DAQ independently of one	
Establish procedure for running subsections of the DAQ independently of one	
another (partitioning).	
Crown d Dulog & Accountions	
Ground Rules & Assumptions: N/A	
14/11	
Cost Estimate Source:	
Fermilab labor rates	
Basis of Cost Estimate:	
Past experience	

WBS Element Number:	
	1.19.2.2
WBS Element Name:	
	Halt/Reset/Run & Error Recovery
WBS Element Definit	tion•
WD9 Eichicht Deimi	Establish procedures for Halt/Reset/Run
	Establish procedures for Error Recovery
	Establish processies for Enter News For
ı	
Ground Rules & Assi	umptions:
	N/A
I	
Cost Estimate Source	2:
	Fermilab labor rates
Basis of Cost Estimat	ta.
Dasis of Cost Estimat	Past experience
	1 ast experience

WBS Element Number	er:
	1.19.3
WBS Element Name:	
WDS Element Name.	Commission Control, Timing, and Monitoring System
	Commission Convol, Timing, and Tizonivoring System
WBS Element Definit	
	This element covers the installation and testing of the Control/Monitoring and
	Timing system. The work will be coordinated with the accelerator clock group.
Ground Rules & Assi	
	The Control and monitoring system will be designed explicitly for BteV. The clock
	system installation (design elsewhere) will rely on recent past experience at CDF
	and D0.
G 4 E 4 G	
Cost Estimate Source	Fermilab labor rates
	Terrilliao races
Basis of Cost Estimat	Past experience
	Fast experience

WBS Element Number:		
	1.19.4	
WBS Element Name:		
	Establish Simplest Data Readout Path	
WBS Element Definit	tion•	
WDS Element Deimi	Download test patterns into level 1 buffers; readout into computer.	
	Download test patterns into level 1 buriers, readout into compater.	
I		
Ground Rules & Assi	umptions:	
	Subsystems have been tested and are presumed to be functional	
I		
Cost Estimate Source		
	Fermilab labor rates	
D of Coot Estimat		
Basis of Cost Estimat	Past experience	
	Past experience	

14

WBS Element Number	er:
	1.19.5
WBS Element Name:	
	Integrate Accelerator Clock with BTeV Control/Monitoring and Timing System
l	
WBS Element Definit	tion•
WDS Extincite Beiling	This item and 1.19.4 are done in conjunction with each other. The clock is
	necessary in the operation of the front-end systems.
l	
Ground Rules & Assu	umptions:
	See 1.19.4
l	
Cost Estimate Source	
	Fermilab labor rates
Basis of Cost Estimat	
	Past experience

WBS Element Number:		
	1.19.6	
WBS Element Name:		
	Establish Front-End Timing	
WBS Element Definit		
	The timing has to be synchronized at all front-end subsystems. The clock offsets	
	have to be determined so the crossing time reads the same for the same event from	
	all subsystems.	
Į		
Ground Rules & Assumptions:		
	Assume that the timing distribution system has been tested and all subsystems can	
	accept the clock and read back data.	
	•	
G . T . t g		
Cost Estimate Source		
	Fermilab labor rates	
D 1 40 (D1)		
Basis of Cost Estimat		
	Time estimates based on experience from CDF and D0.	

WBS Element Number:		
	1.19.6.1	
WBS Element Name:		
WDS Element Name.	Pixel	
	T IACI	
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WBS Element Definit		
	This element checks the front-end timing with Pixels. The test will phase the BCO clock for each chip. Also the test will synchronize reset and startup procedure.	
	Establish use of throttle.	
	Establish use of throtte.	
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Ground Rules & Assi		
	Pixel system has been tested and assumed to be functional	
Cost Estimate Source	o.	
Cost Estilliate Source	Fermilab labor rates	
	1 Climao taooi tacos	
Basis of Cost Estimat		
Basis of Cost Estimat	Past experience	
	r ast experience	
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WBS Element Name: RICH
WBS Element Name: RICH
14011
WBS Element Definition:
This element checks the front-end timing at the RICH detector. Also the test will synchronize reset and startup procedure. Establish use of throttle.
synchronize reset and startup procedure. Establish use of unottie.
Ground Rules & Assumptions:
RICH system has been tested and assumed to be functional
Cost Estimate Source:
Fermilab labor rates

Basis of Cost Estimate:
Past experience
7 W

	WBS Element Number:		
1.19.6.3			
WBS Element Name:			
EM Calorimeter	\neg		
En culvimote.			
WBS Element Definition:	_		
This element checks the front-end timing at the EM Calorimeter. Also the test will synchronize reset and startup procedure. Establish use of throttle.			
synchronize reset and startup procedure. Establish use of unotice.			
	_		
Ground Rules & Assumptions:			
EM Calorimeter system has been tested and assumed to be functional			
Cost Estimate Source:			
Fermilab labor rates			
2			
Basis of Cost Estimate:			
Past experience	_		

WBS Element Number:		
	1.19.6.4	
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WBS Element Name:		
	Muon	
WBS Element Definit		
	This element checks the front-end timing at the Muon system. Also the test will	
	synchronize reset and startup procedure. Establish use of throttle.	
L		
Ground Rules & Assu	amptions:	
	Muon system has been tested and assumed to be functional	
Cost Estimate Source		
	Fermilab labor rates	
l		
Basis of Cost Estimat		
	Past experience	

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WBS Element Number:		
	1.19.6.5	
WBS Element Name:		
WDS Element Name.	Straws	
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MADO El A D. 60		
WBS Element Definit		
	This element checks the front-end timing at the Straw detector. Also the test will synchronize reset and startup procedure. Establish use of throttle.	
	sylemonize reset and startup procedure. Establish use of another.	
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Ground Rules & Assi	amptions:	
	Straws system has been tested and assumed to be functional	
Cost Estimate Source	:	
	Fermilab labor rates	
Basis of Cost Estimat	e:	
	Past experience	

WBS Element Numb	er:
	1.19.6.6
WBS Element Name:	
	Silicon Strip Detectors
TWDCEL 4D 6 4	,•
WBS Element Definit	
	This element checks the front-end timing at the Silicon Strip Detector. Also the test
	will synchronize reset and startup procedure. Establish use of throttle.
G 151 0 4	
Ground Rules & Assi	amptions:
	Silicon Strip system has been tested and assumed to be functional
Cost Estimate Source	:
	Fermilab labor rates
Basis of Cost Estimat	
	Past experience

WBS Element Number:	
	1.19.7
TUDO EL AN	
WBS Element Name:	
	System Integration without Triggers or Event Builder
WBS Element Definit	tion:
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	This item checks all data paths using the CM&T system to down load data patterns.
	Data is buffered and then read into processors for checking.
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Ground Rules & Assu	
	The testing will be done in stages. First one front-end systems at a time, then 2 at a
	time, 3 at a time, all. This staged approach should make trouble shooting
	simpler.
Cost Estimate Source	
	Fermilab labor costs.
l	
Basis of Cost Estimat	
	Experience with CDF and D0 detectors with estimates modified for the BTeV
	detector.
L	

WBS Element Number:		
	1.19.8	
WBS Element Name:		
WDS Element Manic.	Level 1 Trigger Testing	
	20,011,111,885-1-1-1-1-1	
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MDC El Definit		
WBS Element Definit	This element will test the Level 1 Trigger with simulated data and later real tracks.	
	The simulated data will be a first test of the trigger algorithms implemented in the	
	hardware. The results of the hardware trigger will be compared with simulated	
	triggers.	
C 1D-10 A		
Ground Rules & Assi	The subsystems and data paths have been previously tested.	
	The subsystems and data paths have been previously tested.	
Cost Estimate Source		
	This element is rolled up from lower levels.	
l		
Basis of Cost Estimat		
	Prior experience	

WBS Element Number:		
	1.19.8.1	
WBS Element Name:		
WDS Exement Name.	Pixel Trigger	
	1 1110 1110001	
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WBS Element Definit		
	Hardware trigger will be tested against the simulated triggers. Later real event data will be checked.	
	Will be checked.	
•		
Ground Rules & Assi	amptions:	
	This subsystem is functional and the CM&T paths are working.	
Cost Estimate Source	:	
	Fermilab labor rates	
Basis of Cost Estimat	e:	
	Prior experience	

WBS Element Number:	
	1.19.8.2
WBS Element Name:	
WDS Element Name.	Muon Trigger
	Muon Higge.
•	
WBS Element Definit	
	Hardware trigger will be tested against the simulated triggers. Later real event data will be checked.
	will be checked.
l	
Ground Rules & Assi	umptions:
	This subsystem is functional and the CM&T paths are working.
Cost Estimate Source	
Cust Estillate Soul S	Fermilab labor rates
	<u> </u>
Basis of Cost Estimat	e:
2400	Prior experience

WBS Element Number:	
	1.19.8.3
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WBS Element Name:	
	Integration and testing of pixel trigger with global trigger.
WBS Element Definit	
	Hardware trigger will be tested against the simulated triggers. Later real event data
	will be checked.
-	
Ground Rules & Assu	amptions:
	All subsystems are functional and the CM&T paths are working.
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Cost Estimate Source	•
Cost Estimate Source	Fermilab labor rates
	Terrilliao races
L	
Basis of Cost Estimat	թ.
	Prior experience
	Thoi experience

WBS Element Number:	
	1.19.8.4
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WBS Element Name:	
	Integration and Testing of Muon Trigger with Global Trigger
WBS Element Definit	
	Hardware trigger will be tested against the simulated triggers. Later real event data
	will be checked.
~ 151 04	
Ground Rules & Assu	amptions:
	This subsystem is functional and the CM&T paths are working.
ı	
Cost Estimate Source	
	Fermilab labor rates
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Basis of Cost Estimat	
	Prior experience

WBS Element Number:	
	1.19.9
WBS Element Name:	
	Partial Data Acquisition System Testing
TUDG E1 D. # 1	
WBS Element Definit	
	Level 1 buffers to Level 2/3 Processor Array data paths are checked.
G 15 1 0 4	
Ground Rules & Assu	imptions:
	Assume that the subsystems have been tested and are working. Test data will be
	from simulations and test patterns.
Cost Estimate Source	
	Fermilab labor rates
Basis of Cost Estimat	
	Past experience

WBS Element Number:	
	1.19.10
WBS Element Name:	
w bs Element Name:	Integration of Front-End Systems and Their Triggers
	integration of Front End Systems and Their Triggers
WBS Element Definit	
	This element will test the trigger and event builder with simulated data and later
	real tracks. The simulated data will be a first test of the trigger algorithms
	implemented in the hardware. The results of the hardware trigger will be compared
	with simulated triggers. The data to the event builder will also be compared to the simulated data for accuracy.
	simulated data for accuracy.
Ground Rules & Assi	umntione
Ground Rules & Assi	The testing will be done in stages. First one front-end systems at a time, then 2 at a
	time, 3 at a time, all. This staged approach should make trouble shooting
	simpler.
Cost Estimate Source	:
	Fermilab labor rates
Basis of Cost Estimat	۵۰
Dasis of Cost Estimat	Experience with CDF and D0 detectors with estimates modified for the BTeV
	detector.

WBS Element Number:	
	1.19.11
-	
WBS Element Name:	
	System Integration Testing and Commissioning
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WBS Element Definit	
	Full front-end, trigger, and DAQ system integration testing and commissioning
l	
Ground Rules & Assi	umntione
Gibuna Ruics & Assi	All subsystems have been tested and are assumed to be working.
	All subsystems have been tested and are assumed to be working.
•	
Cost Estimate Source	10 10
	Fermilab labor rates
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Basis of Cost Estimat	e:
	Past experience

WBS Element Number:	
	1.19.12
WBS Element Name:	
	Establish and Test DAQ Procedures
WBS Element Definit	tion.
WDS Exement Denni	Establish and test system startup procedure, end of run procedure, and error
	handling procedures.
	nanding procedures.
l	
Ground Rules & Assu	umptions:
	Specification have been set prior to subsystems designing hardware. This will test
	that hardware.
l	
Cost Estimate Source	
	Fermilab labor rates
	Terrimae racer races
Basis of Cost Estimat	
	Past experience

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WBS Element Number:	
	1.19.12.1
WBS Element Name:	
	Induced Errors and System Recovery Testing
WBS Element Definit	
	Error patterns can be down-loaded via the C/M and T paths. The hardware can then
	be tested to determine if these errors are detectable.
Ground Rules & Assi	amptions:
	All subsystems have hardware designed to allow error testing. The specifications
	were established prior to design.
Cost Estimate Source	
	Fermilab labor rates
Basis of Cost Estimat	
	Past experience

WBS Element Number:	
	1.19.13
WBS Element Name:	
WDS Element Name.	Establish Detector Alignment Procedures
	Establish Decesion rangiment recodules
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WBS Element Definit	
	Alignments will be performed within individual systems and from system-to-system. Requirements for alignment will be established prior to construction.
	system. Requirements for angument will be established prior to construction.
Ground Rules & Assi	
	N/A
Cost Estimate Source	0.
Cost Estilliate Source	This element is rolled up from lower levels
	This element is follow up from fower levels
Basis of Cost Estimat	ta·
Dasis of Cost Estimat	N/A
I	

WBS Element Number:	
	1.19.13.1
WBS Element Name:	
wbs Element Name:	Pixel
	TIACI
WBS Element Definit	
	Alignment will be a combination of surveying and track reconstruction with the latter as the definitive test.
Ground Rules & Assi	
	A mechanical alignment will be performed with surveying instruments before the detector is installed. Procedures will be developed for use <i>in situ</i> . Repeatability of the plane movement system (accelerator beam loading avoidance) will be checked. Tracking software specific for alignment will be developed.
'	
Cost Estimate Source	
	This element is rolled up from lower levels. Fermilab labor rates used.
D 1 40 (D)	
Basis of Cost Estimat	**
	Past experience

WBS Element Numb	er:
	1.19.13.2
WBS Element Name:	
	RICH
WBS Element Defini	
	Alignment will be a combination of surveying and track reconstruction with the
	latter as the definitive test.
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Ground Rules & Assi	amptions:
	Detector will have survey targets to aid in surveying. The final check will be track
	data analysis.
Cost Estimate Source	
	Fermilab labor costs
Basis of Cost Estimat	
	Past experience

WBS Element Number:		
	1.19.13.3	
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WBS Element Name:		
	EM Calorimeter	
WBS Element Definit		
	Alignment will be a combination of surveying and track reconstruction with the	
	latter as the definitive test.	
Ground Rules & Assu	amptions:	
	Detector will have survey targets to aid in surveying. The final check will be track	
	data analysis.	
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Cost Estimate Source	:	
	Fermilab labor costs	
Basis of Cost Estimat		
	Past experience	

WBS Element Numb	er:
	1.19.13.4
WBS Element Name:	
	Muon
WBS Element Definit	
	Alignment will be a combination of surveying and track reconstruction with the
	latter as the definitive test.
Ground Rules & Assi	umptions:
	Detector will have survey targets to aid in surveying. The final check will be track
	data analysis.
l	
Cost Estimate Source	10 10
	Fermilab labor costs
Basis of Cost Estimat	
	Past experience

WBS Element Number	er:
	1.19.13.5
WBS Element Name:	
	Straws
INDOEL AD MAN	
WBS Element Definit	
	Alignment will be a combination of surveying and track reconstruction with the
	latter as the definitive test.
G 1D 1 0 4	
Ground Rules & Assu	imptions:
	Detector will have survey targets to aid in surveying. The final check will be track
	data analysis.
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Cost Estimate Source	
	Fermilab labor costs
D : 60 (E4: 4	
Basis of Cost Estimat	
	Past experience

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WBS Element Number:		
	1.19.13.6	
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WBS Element Name:		
	Silicon Strip Detectors	
WBS Element Definit		
	Alignment will be a combination of surveying and track reconstruction with the	
	latter as the definitive test.	
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Ground Rules & Assu	amptions:	
	Detector will have survey targets to aid in surveying. The final check will be track	
	data analysis.	
L		
Cost Estimate Source		
	Fermilab labor costs	
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Basis of Cost Estimat		
	Past experience	

WBS Element Numbe	r:	
	1.19.14	
WBS Element Name:		
	Establish Detector Calibration Procedures	
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WBS Element Definiti	ion:	
	This item coordinates the overall detector calibration. This item is mainly software development to integrate subsystem specific software into the overall BTeV software package.	
Ground Rules & Assumptions:		
	Subsystems develop their own specific calibration techniques. This item integrates them for use in overall detector calibration and for run time checks.	
Cost Estimate Source		
	Roll up of items below	
Basis of Cost Estimate:		
	Past experience	

WBS Element Number:		
	1.19.14.1	
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WBS Element Name:		
	Pixel	
WBS Element Definit		
	This element deals with the calibration specific to the Pixel detector and how to	
	integrate it with the overall BTeV calibration software.	
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Ground Rules & Assu	amptions:	
	Calibration specific to this subsystem is under the subsystem specific details.	
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Cost Estimate Source		
	Fermilab labor costs	
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Basis of Cost Estimat		
	Past experience	

WBS Element Number:		
	1.19.14.1	
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WBS Element Name:		
	RICH	
WBS Element Definit		
	This element deals with the calibration specific to the RICH detector and how to	
	integrate it with the overall BTeV calibration software.	
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Ground Rules & Assu	amptions:	
	Calibration specific to this subsystem is under the subsystem specific details.	
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Cost Estimate Source		
	Fermilab labor costs	
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Basis of Cost Estimat		
	Past experience	

WBS Element Numb	er:
	1.19.14.3
WBS Element Name:	
	EM Calorimeter
WBS Element Definit	tion•
WDS Element Delim	This element deals with the calibration specific to the EM Calorimeter and how to
	integrate it with the overall BTeV calibration software.
	megrate it with the costant 2.10 contestants.
Ground Rules & Assi	umptions:
	Calibration specific to this subsystem is under the subsystem specific details.
Cost Estimate Source	»:
Coor Estimate Society	Fermilab labor costs
Basis of Cost Estimat	
	Past experience

WBS Element Numb	er:
	1.19.14.4
WBS Element Name:	
	Muon
WBS Element Definit	tion•
WDS Extincit Delimi	This element deals with the calibration specific to the Muon detector and how to
	integrate it with the overall BTeV calibration software.
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Ground Rules & Assi	umptions:
	Calibration specific to this subsystem is under the subsystem specific details.
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Cost Estimate Source	
	Fermilab labor costs
Basis of Cost Estimat	
Basis of Cost Estimat	Past experience
	Past experience

WBS Element Number	er:
	1.19.14.5
WBS Element Name:	
	Straws
WBS Element Definit	tion•
WDS Extincit Definit	This element deals with the calibration specific to the Straw detector and how to
	integrate it with the overall BTeV calibration software.
Ground Rules & Assi	umptions:
	Calibration specific to this subsystem is under the subsystem specific details.
1	L
Cost Estimate Source	
	Fermilab labor costs
Basis of Cost Estimat	ta•
Dasis of Cost Estimat	Past experience
	T ust experience

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WBS Element Number:	
	1.19.14.6
WBS Element Name:	
WDS Element Name.	Silicon Strip Detectors
	Sincon Surp Detectors
•	
WBS Element Definit	
	This element deals with the calibration specific to the Silicon Strip detector and how to integrate it with the overall BTeV calibration software.
	now to integrate it with the overall biev canoration software.
1	
Ground Rules & Assi	amptions:
	Calibration specific to this subsystem is under the subsystem specific details.
	<u> </u>
Cost Estimate Source	:
	Fermilab labor costs
Basis of Cost Estimat	e:
	Past experience

WBS Element Numb	er:
	1.19.15
WBS Element Name:	
WBS Element Name.	ES&H
WBS Element Definit	tion.
WDS Element Denni	All overall safety issues are covered in this item. Subsystem specific items are
	under the appropriate subsection. Interlocks between subsystems and the
	accelerator are included here.
Ground Rules & Assi	umntions
Ground Rules & Hiss	Assume all subsystems comply at the "internal" subsystem level. The overall
	interaction between subsystems is checked here. The review here should lead to
	operational of the detector from the laboratory.
G 4 T 4 G	
Cost Estimate Source	This element is rolled up from lower levels.
	This element is foliced up from lower levels.
Basis of Cost Estimat	e:
	Past experience

WBS Element Numb	er:
	1.19.15.1
WBS Element Name:	
	Compliance-Testing and Verification
WBS Element Defini	
	All subsystems are checked for compliance with Fermilab regulations. The items
	include electrical safety (high and low voltage), cooling, hazardous materials
	(gases, chemicals, radioactive, etc).
Ground Rules & Assi	umntions:
Ground Rules & 1155	Assume that all subsystems have had prior reviews and this is the final check before
	operational approval is given by the laboratory.
	operational approval is given by the laboratory.
•	
Cost Estimate Source	:
	This element is rolled up from lower levels. Fermilab labor costs.
	-
!	
Basis of Cost Estimat	e:
	Past experience

WBS Element Number	er:
	1.19.15.2
WBS Element Name:	
	Training
WBS Element Definit	
	This item disseminates information to the BTeV personnel. The training sessions
	on safety and operations are held as required.
Ground Rules & Assi	umptions:
	Subsystems will conduct training specific to each. This item covers overall BTeV
	training issues.
Cost Estimate Source	
	Fermilab labor costs
Basis of Cost Estimat	
	Past experience

WBS Element Number:		
	1.19.16	
WBS Element Name:		
	System Installation, Integration & Commissioning Project Management	
WBS Element Definit		
	This element consists of the costs associated with all management activities related	
	to the system installation, integration & commissioning project management.	
Ground Rules & Assi	umntione	
Ground Rules & 1155	This element includes coordination of the work carried out at various institutes,	
	site-visit, vendor visit, book-keeping, accounting, and reporting to internal and	
	external reviews of the project. Review at regular intervals is necessary to keep	
	track of the progress of the project. Travel to various sites are needed to coordinate	
	the smooth running of the project and the timely delivery of components needed	
	from the vendors.	
	nom the ventors.	
Cost Estimate Source		
Cost Estimate Source	The cost is basically an estimate of the number of travels that is deemed to be	
	necessary. It also includes the time that it will take the engineers and technicians to	
	prepare and attend the reviews. Labor is costed at Fermilab rates. All trips are	
	based on experience and costed based on place and length of travel.	
	based on experience and costed based on place and length of traver.	
Basis of Cost Estimat	Δ•	
Dasis of Cost Estimat	Estimate is based on experiences with projects of similar complexity.	
	Estimate is based on experiences with projects of similar complexity.	
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